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PROCEDURES INVESTIGATING PREDICTIVE VALIDITY IN SELECTING VOLLEYBALL TALENTS

Theses of doctoral (PhD) dissertation

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INTRODUCTION

Inspired by the desperate state of volleyball and the lack of results in previous years, the present study aims to discuss methods of looking at predictive validity when selecting top volleyball players, i.e. defining the genetic, environmental and personality factors that give the safest indication of success, thus allowing of the earliest selection and nurturing of the most talented. During the research, among the genetic factors priority was given to anthropometric parameters, especially those that had been put in the foreground by international studies as guarantee of future success.

The qualitative, measurement-based research targets the development of children and adolescents. However, with certain limitations it can be applied to other age groups as well.

1. Defining the research terms as used in the professional literature

To identify the conditions of success in volleyball we need to go back to the definitions of talent, sports talent, and selection. Numerous Hungarian and international publications have been used in order to find the conditions most necessary to identify sports talent.

Definition of talent. Talent used to be regarded as similar to intelligence, thus the difference in intellectual competences was measured with intelligence tests. Later, some tried to further develop intelligence tests, while others focused their attention on investigating the structure of intelligence and measuring specific skills instead. Side by side with a variety of talent theories, models of talent appeared on the scene which, supporting the viability of multifactor theories set out to map the components of talent and the interactions among them.

Sports talent. It was in the 1950's that sports talent was first given special attention by experts. By studying top sportsmen and their direct environment they hoped to find the best methods to identify and select those presumed to be gifted. The two directions research targeted were identifying sports talent and developing it.

Selection process. The most effective way of recognising and nurturing sports talents is when they are selected, applying scientific methods. This is a process whose goal is to find children with abilities exceeding those of their peers, and urge them to do sports. During the 'new generation' training programme, these children need to be observed and tested on various aspects, using methods that can predict their aptitude for the next developmental phase. Observation and testing should focus on anthropometric parameters, performance in motor skills, physiological functions, personality traits, and environmental factors.

2. Selection methods arising from the nature of volleyball

Volleyball. Volleyball is a game, a team sport, differing from other games in the way the ball is touched. Due to the so-called bouncing touch (the ball cannot be caught and held) players have only a split second to give the ball the right arch, direction, and momentum. Consequently, success will depend on how well the technical elements (serve, pass, set, attack, block and dig) are performed. What players need most of all is agility and dynamic strength. Another special feature is the absence of direct one-against-one fight between the players of the two teams, as the teams are separated by a net. The ball is to be passed over the net into the opposing court. To be able to effectively perform the task, players need to be tall with relatively long limbs. Additionally, they must be able to estimate the distance between the ball, the player and the opponent, the ball's velocity and direction, and predict potential changes. Players can rely on their excellent spatial orientation skills.

A match lasts until a certain number of points are scored, so the length of a match or of a set cannot be predicted, it varies from 40 minutes to two hours. All through this time players must focus on the ball. The outcome of a tight, dramatic situation, a set or even a match might depend on how persistently a player can concentrate.

Selection criteria. The following selection criteria are recommended in the case of volleyball: shape and build, height (adult height predicted), difference between biological and calendar age, motor skills to measure velocity and explosive arm-leg-trunk strength, ball sense, environmental factors and personality traits, performance in matches.

3. Research participants, data sources, analysis methods

The research was planned to involve the players of 5 boys' and 5 girls' volleyball teams in two age groups: children (13-14) and adolescents (15-16), altogether 200-240 players in 20 teams.

Selection criteria were as follows: 1. there should be a team from Budapest and another from elsewhere in the country, 2. they should belong to 'new generation' top teams, 3. should be easily accessible, 4. with approximately the same number of female and male players. As the children and adolescent teams of one of the men's clubs were withdrawn from the championship the final number of teams involved went down to 18, accounting for 25% of the total number of 'new generation' teams (girls: 42 from both age groups, boys: 33 from both age groups). Within the teams, samples were obtained from the full sampling frame (n=141).

The study included 7 data collection sources, and data were obtained between November 2012 and March 2013. Based on professional literature from Hungary and abroad, findings of international studies and our own experience, the following approach was selected as most applicable.

To examine genetic factors 24 vital statistics were recorded which were used to analyse shape and build, predicted adult height, difference between biological and calendar age, and a test of motor skills (18 meters sprint, stuffed ball toss forward, stuffed ball roll back, sit-up, standing broad jump, standing jump with one hand, special running with change of direction), to measure velocity and explosive arm-leg-trunk strength.

Environmental and personality factors were examined with the help of two questionnaires, one filled out by the players and another by their parents. The players' questionnaire contained 22 items built around five main points: attitude to sports, performance motivation, personal and objective conditions of preparation, extent of support from direct environment, and how far sport motivation is part of how they envisage their future. Some items in the parent questionnaire appeared in the players' questionnaire as well – partly to check the answers given by the children, partly to provide ground for comparison.

Further items focused on the parents' job, living conditions, family structure, the sporting habits of both parents and children, the children's school performance, extent of support to volleyball player child, relationship between parents and coach.

Evaluation of technical skills and performance. Ball handling skills, the most obvious sign of technical skills and the overall training performance shown in a nearly 6-month-long period were evaluated on a 1-5 scale, in cooperation with the coaches. Furthermore, 5 technical elements were graded on a three-point scale in 3 matches for the players included in the study (54 matches, 3005 serves, 2984 serves/passes, 3208 attacks, 2314 sets, 910 blocks).

Data were processed using SPSS 17.0. In many cases descriptive statistics (mean, standard deviation, minimum and maximum values, frequency) was employed in the analysis of the player parameters. Correlation between the various parameters was always calculated using Pearson Correlation.

Shape and build were measured using the Heath-Carter method.

Performances on the motor skills tests were graded on a 5-point scale using K-means clustering.

In order to lower the anthropometric parameters we applied factor analysis, making it more reliable with KMO and Bartlett's test.

To interpret the variables related to the factors (motor skill trials) we used a factor matrix. So as to make results very accurate the matrix was turned every time. How this factor model fits was defined by examining the differences of the observed and the reproduced correlation coefficients (such differences are the residium).

Players were grouped on the basis of anthropometric parameters according to sex and age group using hierarchical cluster analysis (Ward's method).

4. Data analysis results

When 24 anthropometric parameters were described according to sex and age group we found that many of them had significant connection to age: 14 for girls and 20 for boys. The correlation of the anthropometric parameters and of the motor skill tests showed that most parameters had a significant connection to stuffed ball toss forward and stuffed ball roll back. The 18m sprint and special running with change of direction correlated positively, while standing jump with one hand showed negative correlation with skinfold values.

Those with the highest body measurements performed best in the stuffed ball and standing jump with one hand tasks, while those with the lowest body measurement values stood out in 18m sprint, special running with change of direction and standing broad jump.

Body build analysis showed that both boys and girls were of average central body type with higher endomorph values.

The difference between biological and calendar age was considerable (over 1 year) in the case of only 7 children.

The predicted adult height for both sexes lags behind that recommended for volleyball players: only 4 of the girls and 8 of the boys are predicted to reach the values recommended in the professional literature (at least 180 cm for girls, and at least 190 cm for boys).

When assessing overall performance in the trainings over nearly six months, coaches gave an average 3 to adolescent girls, and 4 to the other groups. As for ball handling skills, both sexes and both age groups were given a 4.

Based on their performance on 3 matches 5 of the 79 girls and 8 of the 62 boys were labelled as outstanding.

All the players involved in the research were appropriately motivated. In the opinion of nearly all of them, the objective conditions are good. Players received suitable support from their direct environment. Over half of the respondents envisage volleyball as part of their future.

5. Profiling the player with outstanding performance

Of the 13 players with outstanding performance 4 girls and 6 boys had higher-than-average in 17 of the 24 anthropometric parameters. Not one of the outstanding sportsmen belonged to the ectomorph or ecto-mesomorph body build type, with willowy, muscular body. The majority had a central type body with high values for the endomorphic (relatively fat) component. The rest were of the endo-mesomorph type (relatively fat – relatively robust).

All of the boys and 3 of the girls performed outstandingly on the shoulder and trunk muscle velocity tests, while 3 of the boys did very well on the abdominal muscle velocity and direction change velocity tests as well.

Two of the girls had outstanding results only in the explosive leg strength tests. Though tall when the data were collected, two of the girls are not predicted to be very tall as adults. In the case of 5 boys both their current height and the predicted adult values match the criteria recommended by the professional literature.

The training performance and the ball handling skills of all the selected players (with the exception of two girls) were given 5 by the coaches.

These outstanding sportsmen tried out several other sports before choosing volleyball. In doing so the girls were influenced by their parents or PE teachers, whereas boys took up sports because of the PE teacher or their friends. All 13 children had a good relationship with their coaches. Each one of them hoped to go on to college/university and carry on playing volleyball side by side with their studies.

To the questions that were included in both questionnaires parents and children gave similar answers, which might prove that the parents knew their children well, and kept a close eye on their sports career.

6. Evaluation of the research, direction of further research

As it is clearly shown in the title of the dissertation, the primary aim of our research was to find methods that guarantee predictive validity when selecting future top volleyball players. The selection processes chosen for the research were meant to cover genetic, environmental and personality factors alike, since they are indicated in the literature as basic factors influencing talent. Although we had not intended to, but we managed to collect plenty more and much more accurate data about the genetic factors, including anthropometric parameters and the motor skills, than about environmental and personality traits. Even within genetic factors we were unable to cover the spectrum regarded as full, since abilities that are so closely linked to volleyball, like spatial view and space perception and their speed, focusing concentration and attention, and anticipation were not included in our research.

This stemmed from the fact that we wanted to apply such measurements, trials, tests and match and training assessment aspects whose validity in selecting talents had been unequivocally proved by the sports science literature. This way, by assessing the selected Hungarian 'new generation' teams using procedures that had already been proved as effective we managed to set up the profile of the best performing sportsmen, supplemented with further features based on data from our own two questionnaires, investigating environmental and personality traits. By increasing the reliability of predicting outstanding future performance, the profile will help coaches and other specialists when selecting new generation volleyball players.

The usefulness of the research findings has been recognised by the head of the national 'new generation' teams and the coach of the Hungarian national volleyball team, and the procedures used in our research have been included in the program of the training course for coaches.

Nevertheless our research would have been more complete if we had incorporated the test focuses mentioned in the sport psychology literature (e.g. space perception, or the ability to anticipate), side by side with the ones from sport science.

It is the list of aspects from sport psychology that offer a potential direction for further research. For this, there would be a need to study relevant sport psychology research, its focus, sources and findings.

Due to its complex nature, this research direction would require expertise not only in the field of sport science but also in sport psychology. For this reason, it would be more feasible to conduct the research in a team, maybe in the framework of international cooperation, and not as an individual research project. As a more reliable indicator of the genetic features and the personality traits, shaped by environmental effects, of sport and volleyball talents, the new research could further increase the predictive validity of selection.

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